

ANKOM

2004-10-21

PCT

NOTIFICATION CONCERNING
TRANSMITTAL OF COPY OF INTERNATIONAL
APPLICATION AS PUBLISHED OR REPUBLISHED

From the INTERNATIONAL BUREAU

To:

LAUTMANN, Kurt
Kurt Lautmanns Patentbyrå AB
Box 245
S-691 25 Karlskoga
SUÈDE

Date of mailing (day/month/year) 14 October 2004 (14.10.2004)
--

Applicant's or agent's file reference Lau PCT-3025

International application No. PCT/SE2004/000464	International filing date (day/month/year) 26 March 2004 (26.03.2004)	Priority date (day/month/year) 04 April 2003 (04.04.2003)
--	--	--

Applicant SUNDQUIST METALL AB et al
--

IMPORTANT NOTICE

The International Bureau transmits herewith the following documents:

copy of the international application as published by the International Bureau on 14 October 2004 (14.10.2004) under
No. WO 2004/088268

copy of international application as republished by the International Bureau on under
No. WO

For an explanation as to the reason for this republication of the international application, reference is made to INID codes (15), (48) or (88) (as the case may be) on the front page of the attached document.

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Authorized officer

Idhir Britel

Facsimile No. +41 22 740 14 35

Facsimile No. +41 22 338 70 90

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
14 October 2004 (14.10.2004)

PCT

(10) International Publication Number
WO 2004/088268 A1

(S1) International Patent Classification⁷:

G01M 3/00

Agent: LAUTMANN, Kurt; Kurt Lautmanns Patentbyrå
AB, Box 245, S-691 25 Karlskoga (SE).

(21) International Application Number:

PCT/SE2004/000464

(22) International Filing Date: 26 March 2004 (26.03.2004)

(25) Filling Language: Swedish

(26) Publication Language: English

(30) Priority Data:
0301002-2 4 April 2003 (04.04.2003) SE

(71) Applicant (for all designated States except US):
SUNDQUIST METALL AB (SE/SE); Filarevägen
4, S-703 75 Örebro (SE).

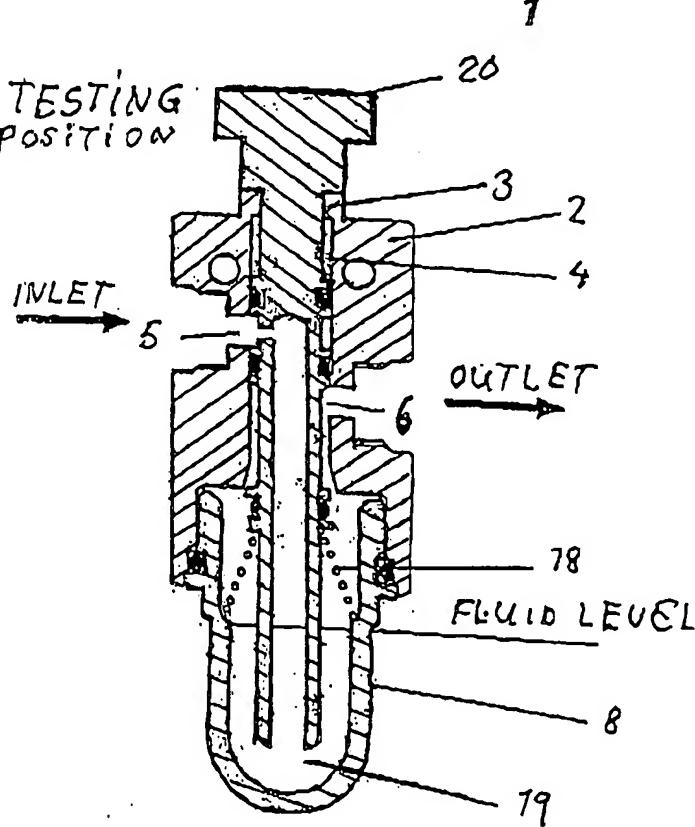
(72) Inventor; and
(75) Inventor/Applicant (for US only): **GUSTAFSSON, Morgan** [SE/CH]; Im Eichli 15, CH-6315 Oberägeri (CH).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GI, GM, HR, HU, ID, IL, IN, IS, JP, KB, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SI, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK,

[Continued on next page]

(54) Title: DEVICE FOR DETERMINING EFFECTS SUFFERED BY A FLOW-CONTROLLED GASEOUS MEDIUM



(57) **Abstract:** Liquefied petroleum gas is widely used in leisure time activities. Here, as liquefied petroleum gas is highly inflammable, it is important to have an indicator (19) that quickly determines whether there is leakage. The present invention relates to a new leak indicator (19) that, when an easily operated button (20) is pushed downwards into a cavity (8), indicates whether or not there is leakage. The space confined in the cavity (8) is completely closed off when the appertaining liquefied petroleum gas system is in normal operation mode.

WO 2004/088268 A1



TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, — *with amended claims*
ML, MR, NE, SN, TD, TG).

Published:

— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

/P-A

1

DEVICE FOR DETERMINING EFFECTS SUFFERED BY A FLOW-CONTROLLED
GASEOUS MEDIUM

The present invention is based on a device for determining the effects suffered by a
5 flow-controlled gaseous medium. An explanatory instance of this is a gaseous
medium carried in pipes from a supply point to various consumption points. At these
latter points, there is usually a desire to check that the medium has not suffered any
undesirable effects. The flow may have been affected by leakage, in which case, air
bubbles will have become trapped in the medium. This can be determined by having
10 the medium flow through a fluid, which will disclose the presence of air bubbles. The
gaseous medium may also have picked up undesirable substances. Once again, the
medium can be passed through an indicator, such as a fluid, that will, for example,
change colour if undesirable substances are present. There are many possible
variations. The most suitable way of determining whether a gaseous medium has
15 suffered an undesirable effect is to have the controlled flow pass through a device
where, by switching from operation mode to test mode, it can be determined whether
the medium has been exposed to extraneous influences.

There are already such devices on the market but, as is not uncommon, these have
20 certain disadvantages.

The present invention is designed to present a new device that has taken into
account the disadvantages of the already available devices. In one known device to
determine any effects, a control (actuator) can be switched between two positions. In
25 one of these positions, the gaseous medium passes directly through the device. In
the other, it passes through an indicator, which may be a fluid. When it is necessary
to carry out a test, said actuator must be moved upwards. This is a manoeuvre that,
in a crisis situation, works poorly and feels unnatural for any user in such a situation.
Thus, in the present invention, the actuator has been so arranged that, when it is
30 desired to obtain information regarding leakage, the actuator is pressed downwards.
This is the most natural reaction of users in crisis situations. A unit with a device as

per the present invention can be located in an object that can be subject to various forms of movement. In such cases, it must not be possible for the indicator to leave its confines to permit the through-flow of the gaseous medium. The invention is so constructed that, in normal operating mode, the indicator is completely closed off from the through-flow of the gaseous medium.

The invention is characterised by a housing that has a cylindrical cavity in which a cylindrical flow control body can move between an upper and a lower position. Between the inner surface of the housing that provides the cavity and the outer surface of the control body, there are three seals. These seals are fixed to, and spaced along, the outer surface of the flow control body and are in contact with the inner surface of the housing that provides the cavity. They are so placed that, in an upper position, direct free passage is provided for the gaseous medium to flow through the device while, at the same time, the compartment holding the indicator is completely closed off. In the other position (a position for testing) i.e. when the cylindrical body is in its lower position, the gaseous medium's direct free passage through the device is blocked while the flow control body creates an alternative route by opening the indicator and the lowest seal for free passage. Thus, with the flow control body in its upper position, the indicator compartment is completely closed off and the gaseous medium can only flow directly through the device. However, with the flow control body in its depressed position, the gaseous medium is forced to flow through the indicator before exiting the device.

Other characteristics of the present invention are disclosed in the following patent claims.

One design of the present invention is described in the explanation of the attached drawing, where:

30 Fig. 1 shows the device where it only permits direct free passage of a gaseous medium, and

Fig 2 shows the device set so that the gaseous medium passes through an indicator before exiting the device.

The figures show a device that, in the operating mode, permits the direct passage of
5 a gaseous medium without said medium being subjected to any extraneous influences whatsoever. The device can also be activated so that the gaseous medium has to pass through an indicator that has the function of determining whether said medium has been exposed to any extraneous influences, e.g. leakage. Thus, a device as per both figures is used by connecting it into a conduit through which there
10 is a flow of a gaseous medium. Connection is achieved by making a break in the conduit and connecting the ends via the inlet and the outlet of the device.

The device shown in both figures is intended for connection into a pipe forming part of a liquefied petroleum gas (LPG) system. Of course, the device is not restricted to use
15 in LPG systems. It can be used in all cases where it is sought to determine whether a gaseous medium has suffered any effects.

The figures show the device adapted for an LPG system and serving as a leak indicator. The leak indicator is labelled 1 and comprises a housing (2) with a
20 cylindrical flow control body (3) that can be moved upwards and downwards in a cylindrical cavity (4) in the housing (2). As the diameter of the cylindrical flow control body (3) is less than that of the cavity (4), a ring-shaped cylindrical (tubular) void is left between the cylindrical flow control body (3) and the cavity (4). This void connects to an inlet (5) for a gaseous medium that is intended to flow through the housing (2) and exit it via an outlet opening (6). In figure 1, part of said tubular void is labelled 7 and it can be seen how the gaseous medium flows through the tubular void (7) and then exits the housing (2) through the outlet (6). Spaced along its outer surface, the cylindrical flow control body (3) has three seals (15 – 17). In figure 1, seals 16 and 17 delimit the gas flow through the indicator (1). At its lower end, housing 2 has a further
30 housing (8) for a fluid or other indicator medium. Housing 8 is joined to housing 2 via a fastening device (9). The cylindrical flow control body (3) encloses its own

cylindrical cavity (13). This cavity is axially disposed, closed at its top but open at the lower end of the cylindrical flow control body (3). The open end is labelled 14. Towards its upper end, cylindrical cavity 13 has an opening (12) located between seals 15 and 16. This opening provides a direct connection to the void around the 5 cylindrical flow control body (3). All three seals (15 – 17) are firmly fixed to the flow control body (3). Housing 2 has a spring (18) that, at one end, rests on seal 17 and, at the other, against a part of the housing. Through the action of this spring (18), the cylindrical flow control body (3) automatically takes up its top position. Thus, when a test reading is required, the actuator (20) must be manually pressed down. As soon 10 as the downwards pressure is removed, the cylindrical flow control body (3) returns to its original (home) position.

In the above manner, the present invention serves as a leak indicator. When the leak indicator's actuator is pressed down, an indication is given of whether there is or is 15 not a gas leak. That the leak indicator's actuator always takes up its topmost position in the absence of external pressure is a valuable safety feature. Owing to the design of the invention, indicator fluid can never flow into the passage for the direct through-flow of the gas, even when the invention is not in what would be considered its normal position.

20

25

30

PATENT CLAIMS

1. Device (1) to determine if a flow-controlled gaseous medium has suffered any effects, the device, in the normal operating position, allowing the medium free and direct through-passage and, in the testing position, allowing the medium to pass through an indicator (19), e.g. a fluid, that indicates the type of influence to which the medium has been exposed. Said device (1) comprises a housing (2) with a flow control body (3) that can move between two positions, the medium being able to flow directly through the device (1) with said body in one of its positions and being forced to flow through the indicator with said body in its other position, the whole being characterised by the housing (2) and flow control body (3) being so designed that, with the latter in one of its positions (the upper position), the medium flows directly through the device (1) while, contemporaneously, the indicator (19) is closed off from the device's direct channel (5 – 7) for the medium and, with the flow control body (3) in its other position (the lower position), said channel (5 – 7) being broken and replaced by a channel (13) through the indicator.
2. Device as per patent claim 1,
characterised by the flow control body (3) constantly taking up a home position (the upper position) owing to the action of a spring (18).
3. Device as per patent claim 1,
characterised by the flow control body (3) being cylindrical and mobile within a cylindrical cavity (4) in the housing (2) and, additionally, by the flow control body (3) having three seals (15 – 17) spaced along it and projecting from the body (3) to the perimeter of the cavity (4), the lower seal (17) and the middle seal (16) working together to form a direct through-flow channel (5 – 7) and the lower seal (17) completely closing off the indicator (19) from said direct through-flow channel (5 – 7).

4. Device as per patent claim 2,
characterised by the flow control body (3) itself having a cavity (13) that, at the
body's lower end, is completely open, there also being an opening (12) at the
upper end of the cavity (13), said opening, when the flow control body (3) is in its
lower position, connecting to the direct through-flow channel (5 – 7).

5

5. Device as per patent claim 1,
characterised by the indicator (19) being a fluid such as propylene glycol in a
compartment/housing (8) that, preferably, is transparent.

10

6. Device as per one or more of the preceding patent claims,
characterised by the device being connected into a system for the use of liquefied
petroleum gas, the connection being made in such a way that the device is
capable of determining whether there is leakage.

15

20

25

30

AMENDED CLAIMS

[Received by the International Bureau on 21 July 2004 (21.07.04) ;
original claims 1-5 replaced by amended claims 1-6 (2 page)]

PATENT CLAIMS

1. Device (1) to determine if a flow-controlled gaseous medium has suffered any effects, the device, in the normal operating position, allowing the medium free and direct through-passage and, in the testing position, allowing the medium to pass through an Indicator (19), e.g. a fluid, that indicates the type of influence to which the medium has been exposed. Said device (1) comprises a housing (2) with a flow control body (3) that can move between two positions, the medium being able to flow directly through the device (1) with said body in one of its positions and being forced to flow through the indicator (19) with said body in its other position, the housing (2) and flow control body (3) being so designed that, with the latter in one of its positions (the upper position), the medium flows directly through the device (1) while, contemporaneously, the indicator (19) is closed off from the device's direct channel (5 – 7) for the medium and, with the flow control body (3) in its other position (the lower position), said channel (5 – 7) being broken and replaced by a channel (13) through the indicator, the whole being characterised by the flow control body (3) being cylindrical and mobile within a cylindrical cavity (4) in the housing (2) and, additionally, by the flow control body (3) having three seals (15 – 17) spaced along it and projecting from the body (3) to the perimeter of the cavity (4), the lower seal (17) and the middle seal (16) working together to form a direct through-flow channel (5 – 7) and the lower seal (17) completely closing off the indicator (19) from said direct through-flow channel (5 – 7).
- 25
2. Device as per patent claim 1,
characterised by the flow control body (3) itself having a cavity (13) that, at the body's lower end, is completely open, there also being an opening (12) at the upper end of the cavity (13), said opening, when the flow control body (3) is in its lower position, forming a through-flow channel (5 – 13 – 7).
- 30
3. Device as per patent claim 1,
characterised by the indicator (19) being a fluid such as propylene glycol in a compartment/housing (8) that, preferably, is transparent.

WO 2004/088268

PCT/SE2004/000464

8

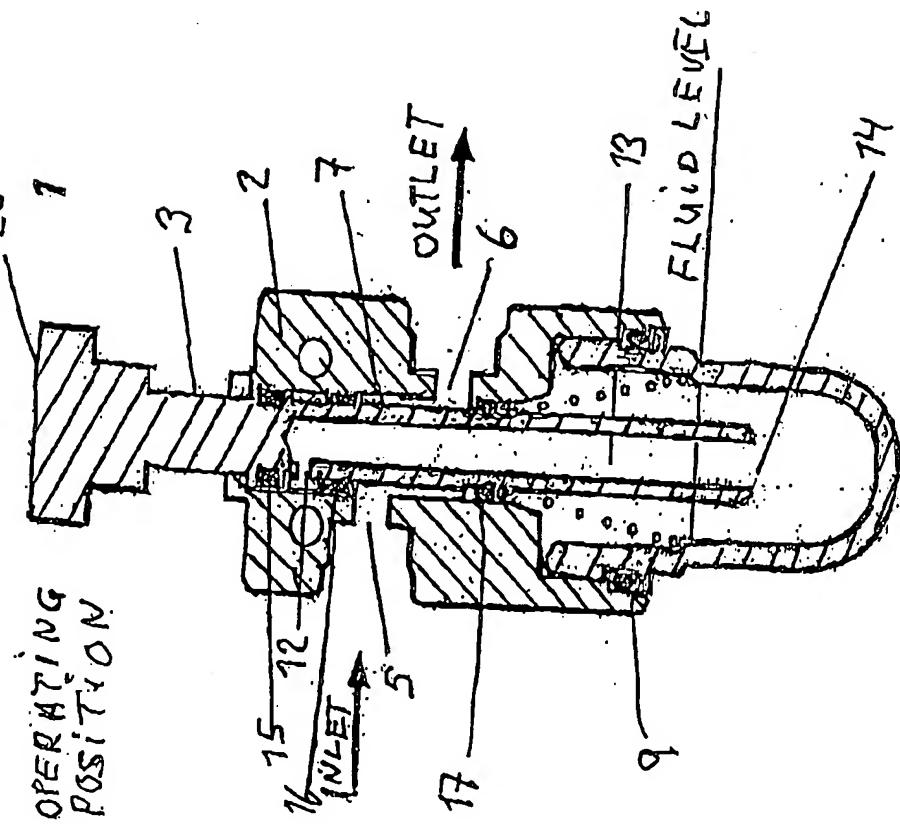
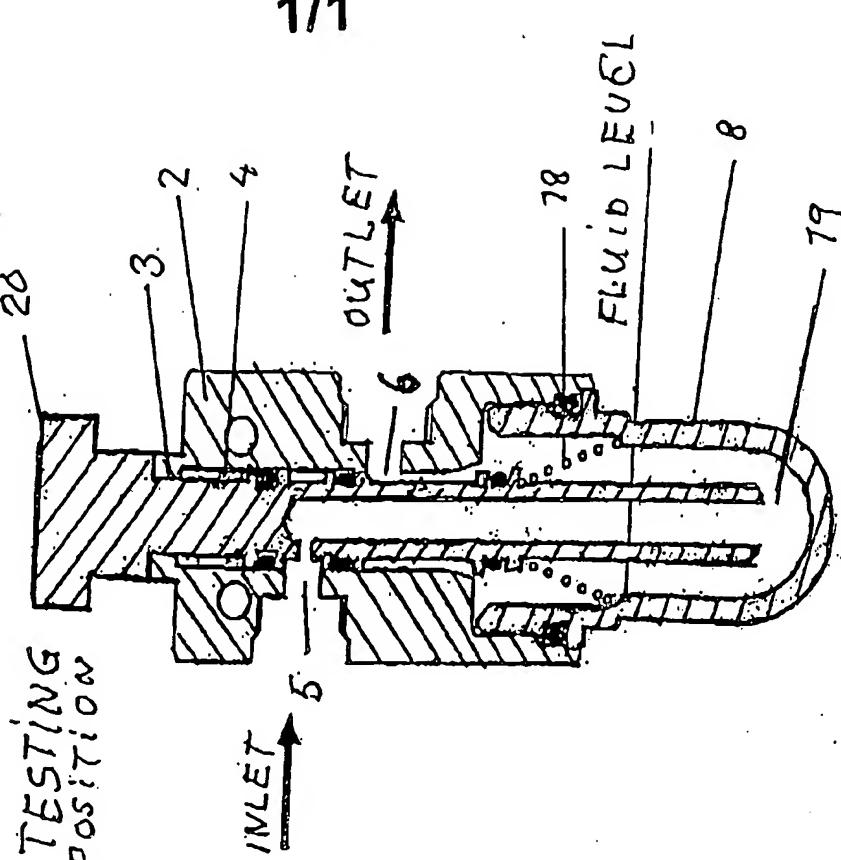
4. Device as per one or more of the preceding patent claims, characterised by the device being connected into a system for the use of liquefied petroleum gas, the connection being made in such a way that the device is capable of determining whether there is leakage.

5

5. Device as per patent claim 1, characterised by the flow control body (3) constantly taking up a home position (the upper position) owing to the action of a spring (18).

10.

1/1

Figur 1
OPERATING POSITIONFigur 2
TESTING POSITION

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 2004/000464

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: G01M 3/00
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: G01M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE, DK, FI, NO classes as above

Electronic data base consulted during the International search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4077427 A (ROSAN, JR, J ET ALX), 7 March 1978 (07.03.1978), whole document --	1-6
X	US 3583435 A (STEWART, B D), 8 June 1971 (08.06.1971), whole document --	1-6
A	US 1959863 A (GRISS, F G), 22 May 1934 (22.05.1934), figures 1,2 --	1-6
A	US 4068522 A (POE, L R), 17 January 1978 (17.01.1978), abstract --	1-6

Further documents are listed in the continuation of Box C.

See patent family annex.

- * Special categories of cited documents:
 - "A" document defining the general state of the art which is not considered to be of particular relevance
 - "E" earlier application or patent but published on or after the international filing date
 - "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
 - "O" document referring to an oral disclosure, etc, exhibition or other means
 - "P" document published prior to the international filing date but later than the priority date claimed
- T later document published after the International filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- X document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- Y document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- & document member of the same patent family

Date of the actual completion of the international search

4 June 2004

Date of mailing of the international search report

23-06-2004

Name and mailing address of the ISA/
Swedish Patent Office
Box 5055, S-102 42 STOCKHOLM
Facsimile No. +46 8 666 02 86

Authorized officer

Lars Jakobsson /LR
Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT
Information on patent family members

30/04/2004

International application No.
PCT/SE 2004/000464

US	4077427	A	07/03/1978	AU	499947 A,B	03/05/1979
				DE	2751142 A	17/05/1979
				GB	1550546 A	15/08/1979
				NL	7712192 A	08/05/1979

US	3583435	A	08/06/1971	CH	513358 A	30/09/1971
				DE	2042198 A,B,C	11/03/1971
				FR	2061117 A	18/06/1971
				GB	1320209 A	13/06/1973
				JP	49014808 B	10/04/1974
				NL	155350 B	15/12/1977
				NL	7013065 A	10/03/1971
				SE	362499 B	10/12/1973
				US	RE29330 E	02/08/1977

US	1959863	A	22/05/1934	NONE	
----	---------	---	------------	------	--

US	4068522	A	17/01/1978	NONE	
----	---------	---	------------	------	--